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# Materials Engineers

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## Nature of the Work

Materials engineers are involved in the extraction, development, processing, and testing of the materials used to create a diversity of products, from computer chips and television screens to golf clubs and snow skis. They work with metals, ceramics, plastics, semiconductors, and combinations of materials called composites to create new materials that meet certain mechanical, electrical, and chemical requirements. They also are involved in selecting materials for new applications.

There are numerous new developments within materials engineering that make it possible to manipulate and use materials in various ways. For example, materials engineers have developed the ability to create and then study materials at an atomic level using advanced processes to replicate the characteristics of materials and their components with computers.

Most metallurgical engineers work in 1 of the 3 main branches of metallurgy—extractive or chemical, physical, and process. Extractive metallurgists are concerned with removing metals from ores and refining and alloying them to produce suitable inputs for a number of industrial processes. Physical metallurgists study the nature, structure, and physical properties of metals and their alloys to find the best methods of processing basic materials into final products. Process metallurgists develop and improve metalworking processes such as casting, forging, rolling, and drawing. Most materials engineers specialize in a particular material. For example, metallurgical engineers specialize in metals, while ceramic engineers develop ceramic materials and the processes for making ceramic materials into useful products. Ceramics include all nonmetallic, inorganic materials that generally require high temperatures in their processing. Ceramic engineers work on products as diverse as glassware, automobile and aircraft engine components, fiberoptic communication lines, tile, and electric insulators.

## Employment

Materials engineers held about 24,000 jobs in 2002. Because materials are building blocks for other goods, materials engineers are widely distributed among manufacturing industries. In fact, 68 percent of materials engineers worked in manufacturing industries, primarily computer and electronic products, transportation equipment, fabricated metal products, primary metal production, and machinery manufacturing. They also worked in services industries such as professional, scientific, and technical services. Most remaining materials engineers worked for Federal and State governments.

## Job Outlook

Employment of materials engineers is expected to grow more slowly than the average for all occupations through 2012. Although many of the manufacturing industries in which materials engineers are concentrated are expected to experience declines in employment, more materials engineers will be needed to develop new materials for electronics, biotechnology, and plastics products. As manufacturing firms contract for their materials engineering needs, employment growth is expected in professional, scientific, and technical services industries. In addition to those arising from employment growth, job openings will result from the need to replace materials engineers who transfer to other occupations or leave the labor force.



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## Earnings

Median annual earnings of materials engineers were \$62,590 in 2002. The middle 50 percent earned between \$49,810 and \$77,500. The lowest 10 percent earned less than \$39,360, and the highest 10 percent earned more than \$92,690.

According to a 2003 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in materials engineering received starting offers averaging \$44,680 a year.

## Sources of Additional Information

For information on careers, education, accreditation, and other topics related to materials engineers, contact:

- The Minerals, Metals, & Materials Society, 184 Thorn Hill Rd., Warrendale, PA 15086. Internet: <http://www.tms.org>
- ASM International, 9639 Kinsman Rd., Materials Park, OH 44073-0002. Internet: <http://www.asm-intl.org>

See the introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.